QB Series

Precision Balance

Operation Manual

RICE LAKE WEIGHING SYSTEMS
Industrial Solutions on a Global Scale®

ISO 9001 REGISTERED

42194

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Technical training seminars are available through Rice Lake Weighing Systems. Course descriptions and dates can be viewed at www.rlws.com or obtained by calling 715-234-9171 and asking for the training department.

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January 2003

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About This Manual

The QB Series precision balance is an advanced precision weighing instrument incorporating a highly-sophisticated electronic tuning fork sensor assembly capable of providing quick, reliable, and stable weight measurement. This manual is intended to give users guidelines and specifications to ensure proper use and care of the device.

1.0 Introduction

The QB Series balance contains several features to provide optimum performance.

Standard features include:

- Twelve program-selectable units of measure, including: grams (g), kilograms (kg), pounds (lb), carats, decimal oz, troy ounces, pennyweights, grain, Hong Kong tael, Sin tael, Taiwanese tael, or momme

  NOTE: Display shows ▸ to indicate unit of measure other than g, kg, or lb.

- Three independent operating modes (straight weighing, piece counting, and over/under checkweighing)
- Virtual immunity from external vibrations
- No warm-up time
- Ultra-fast response time
- Built-in automatic zero tracking
- Die-cast aluminum housing to resist corrosion and EMI
- Liquid crystal display (LCD) – 0.5" (12.5mm)
- Standard 115 VAC adapter (230 VAC adapter optional)
- Automatic shut-off (used with battery operation only)
- Front panel controls
- Automatic sleep mode (when used with internal rechargeable battery pack only)
- Large weighing platform

Options include:

- Glass breeze break (for nominal capacities of 620g and below)
- RS-232C for interfacing with a printer or other peripheral equipment
- Internal rechargeable battery (operates for 32 hours on one charge)

NOTE: There are many AC adapters available in the marketplace. If you should need to replace the AC adapter provided with this unit, we recommend that you choose the RLWS AC adapter PN 42566 for 115 VAC or PN 42168 for 230 VAC use. Use of any other AC adapter can void the warranty.

1.1 Unpacking and Inspection

Each QB Series balance comes with the following components (see Figure 1-1 on page 2).

- AC adapter
- Weighing platform (round or rectangle, model dependent)
- Weighing platform support (size is model dependent)

Be sure all components have come with your QB Series balance.

NOTE: Store the packing material and box in a safe, easily accessible place. Should you ever need to transport the balance across any substantial distance, using the original packing material is the first step to protecting your investment.

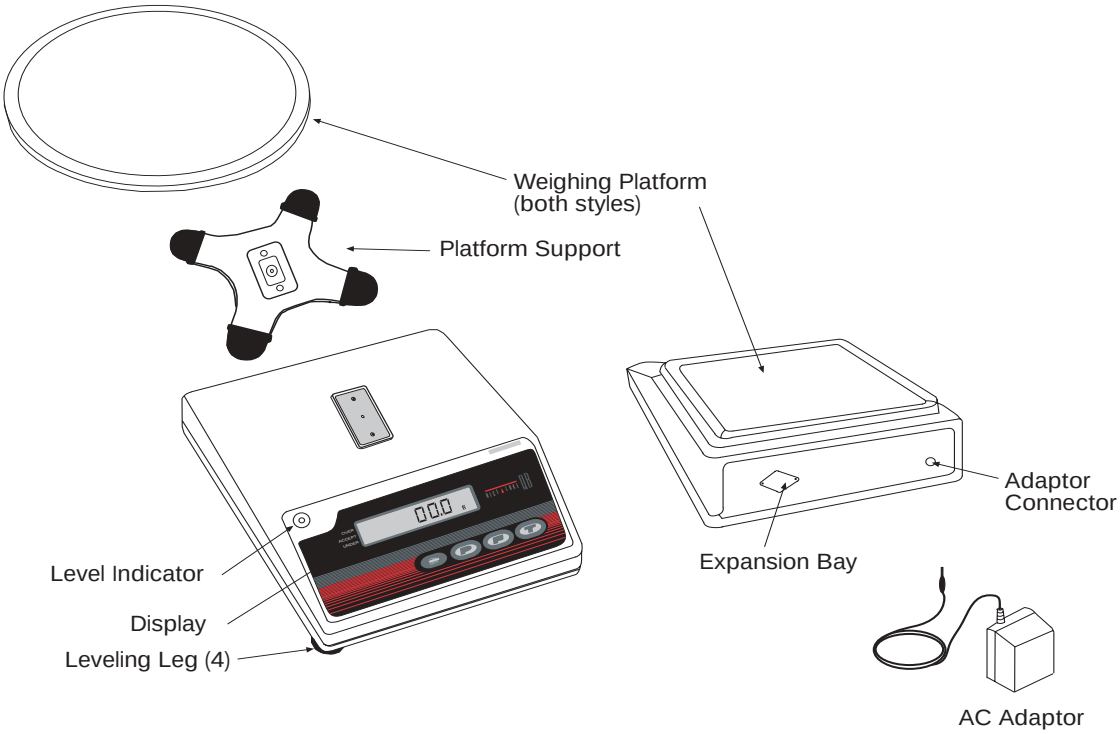


Figure 1-1. Main Component Parts of the QB Series

1.2 General Care and Maintenance

To keep your QB Series balance operating properly, the device needs to be maintained and cared for. Keep the housing and platform clean by wiping them off with a soft damp cloth daily. If necessary, use a slight solution of water and dish soap to clean away stains and dirt. Check under the platform support area for any build up of dirt and debris that could interfere with the mechanism. Keep your calibration masses in a safe, dry area. Unplug the AC adapter when the device is not in use. For long term storage, remove the internal battery (if equipped).

1.3 Installation Guidelines

For optimum performance, we recommend that you use your QB Series device in a clean, stable environment. Avoid the following:

- Excessive drafts
- Significant temperature and/or humidity changes
- Strong magnetic fields exist or equipment that may generate a magnetic field
- Excessive dust
- Unstable or vibrating work surface
- Corrosive gases or large amounts of dust
- Long-term exposure to direct sunlight
- Disassembling or modifying the unit in any way
- Moving the balance when an item is on the weighing platform
- Handling your balance with wet hands
- Shock loading or intentionally overloading the device
- Leaving the device exposed to direct sunlight
- Using any solvents on the device

1.4 Installation Steps

Use the following steps to properly install the QB Series balance:

1. Inspect the leveling legs and ensure that they are all completely retracted.
2. Place the balance down on a firm, level mounting surface.
3. Using the bubble level to the upper left of the display panel as a guide, adjust the leveling legs as necessary until the bubble is centered inside the bulls-eye of the bubble level (see Figure 1-2).

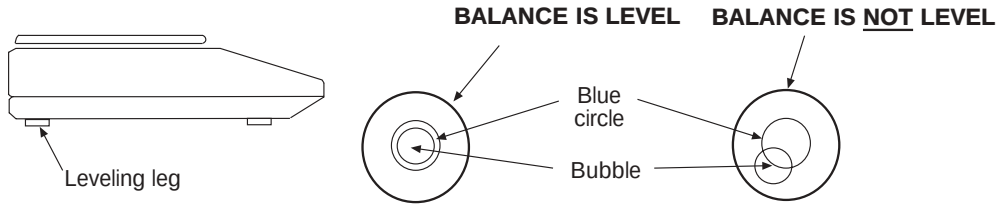


Figure 1-2. Level Adjustment

4. Plug the AC adapter into the back of the unit (see Figure 1-3).

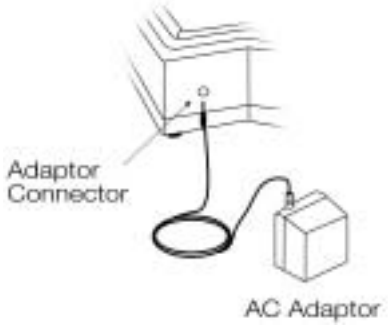


Figure 1-3. AC Adapter Connection

5. Secure the weighing pan support onto the device. Tighten the adjusting knob until it is finger tight. Do not use a screwdriver (see Figure 1-4).

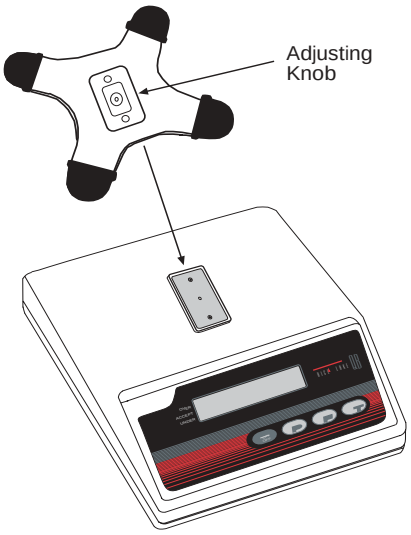


Figure 1-4. Attach Weighing Pan Support

6. Place the platform cover down over the weighing pan support (see Figure 1-1 on page 2 for exploded view).
7. Plug the AC adapter into a suitable wall outlet.

1.5 Special Information

The QB Series balance is a sensitive, precision weighing instrument and should always be treated with care. While every attempt is made prior to shipping to ensure that your balance arrives ready-to-use, uncontrollable events during the shipping process may make it necessary to calibrate the device before being used.

While not absolutely necessary, we recommend that you perform a span calibration prior to using the balance for the first time. Even though your QB Series balance was carefully calibrated at the factory, shipping and the effects of specific gravity can have a negative impact on accuracy. Review Section 3.0 on page 14 for instructions on this feature.

In the event that the device fails to operate properly, contact your Rice Lake Weighing Systems dealer for assistance.

1.6 Front Panel

Figure 1-6 shows the QB Series keypad and key functions. Figure 1-7 on page 5 shows the LCD display segments display.

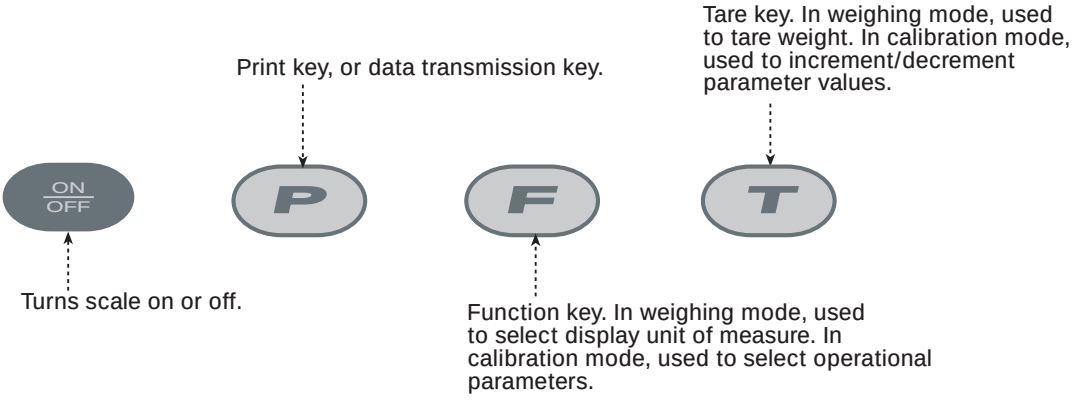

Tare key. In weighing mode, used to tare weight. In calibration mode, used to increment/decrement parameter values.
Print key, or data transmission key.
ON
OFF
P
F
T
Turns scale on or off.
Function key. In weighing mode, used to select display unit of measure. In calibration mode, used to select operational parameters.

Figure 1-5. Front Panel Keypad

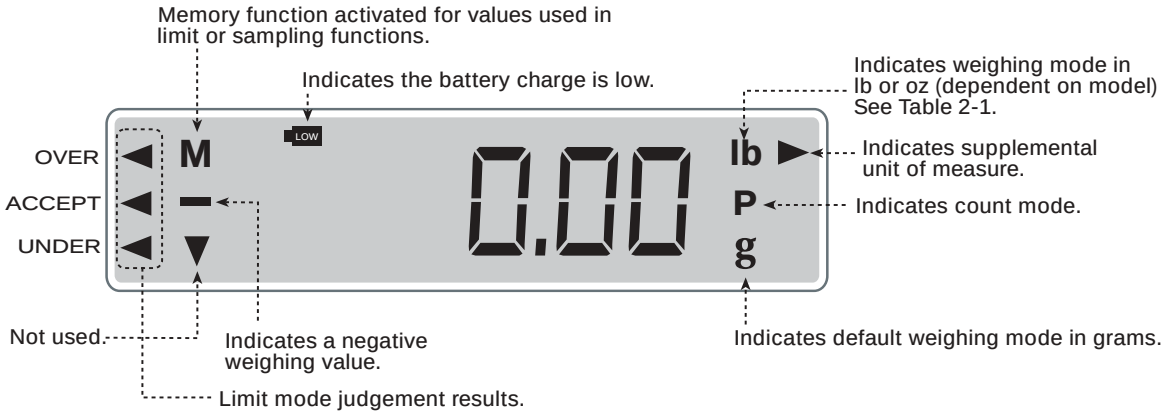


Figure 1-6. QB Series Display Segments

1.7 Powering Up the QB Series Balance

Press and release the ON/OFF key to turn on the QB Series balance.

1. All display segments momentarily illuminate.

2. All display segments momentarily flash.
3. The device activates the default weighing mode and displays the *g* symbol in the lower right corner of the display to indicate that weighments are displayed in grams.

1.8 Powering Down the QB Series Balance

To turn the balance off, press and release the ON/OFF key.

2.0 Weighing Operations

The following section describes weighing operations of the QB Series balance, including: units of measure, general weighing, weighing with a tare, batching, comparator, and piece counting.

2.1 Units of Measure

Table 2-1 shows the various units of measure (maximum capacity and minimum increment) available on your QB Series balance.

NOTE: There is no push-button conversion from one unit to another. The QB Series balance is capable of showing only one unit of measure during a weighing operation. Switching to another unit of measure requires a change in the set up procedure (see Section 2.2).

Unit of Measurement (Display Symbol)	QB-150E	QB-300E	QB-600E	QB-620E	QB-1500E	QB-3000E	QB-6000E	QB-6200E	QB-12KE	Conversion Factor/g
gram (g)	150 x 0.01	300 x 0.01	600 x 0.02	620 x 0.01	1500 x 0.1	3000 x 0.1	6000 x 0.2	6200 x 0.1	12000 x 1	1
kilogram (kg)	0.15 x 0.00001	0.3 x 0.00001	0.6 x 0.00002	0.62 x 0.00001	1.5 x 0.0001	3 x 0.0001	6 x 0.0002	6.2 x 0.0001	12 x 0.001	0.001
carat	750 x 0.05	1500 x 0.05	3000 x 0.1	3100 x 0.05	7500 x 0.5	15000 x 0.5	3000 x 1	31000 x 0.5	60000 x 5	0.2
ounces	5.2 x 0.0005	10 x 0.0005	21 x 0.0005	21 x 0.0005	52 x 0.005	100 x 0.005	210 x 0.005	210 x 0.005	420 x 0.05	28.349527
pound (lb)	0.33 x 0.00002	0.66 x 0.00002	1.3 x 0.00005	1.3 x 0.00002	3.3 x 0.0002	6.6 x 0.0002	13 x 0.0005	13 x 0.0002	26 x 0.002	453.5924
troy ounces	4.8 x 0.0005	9.6 x 0.0005	19 x 0.0005	19 x 0.0005	48 x 0.005	96 x 0.005	190 x 0.005	190 x 0.005	380 x 0.05	31.103481
pennyweight	96 x 0.005	190 x 0.005	380 x 0.01	390 x 0.005	960 x 0.05	1900 x 0.05	3800 x 0.1	3900 x 0.05	7700 x 0.5	1.5551740
grain	2300 x 0.2	4600 x 0.2	9200 x 0.5	9500 x 0.2	2300 x 2	46000 x 2	92000 x 5	95000 x 2	180000 x 20	0.0647989
HK tael	4 x .0002	8 x 0.0002	16 x 0.0005	16 x 0.0002	40 x 0.002	80 x 0.002	160 x 0.005	160 x 0.002	320 x 0.02	37.428932
SIN tael	3.9 x 0.0002	7.9 x 0.0002	15 x 0.0005	16 x 0.0002	39 x 0.002	79 x 0.002	150 x 0.005	160 x 0.002	310 x 0.02	37.799466
TW tael	4 x 0.0002	8 x 0.0002	16 x 0.0005	16 x 0.0002	40 x 0.002	80 x 0.002	160 x 0.005	160 x 0.002	320 x 0.02	37.5
momme	40 x 0.002	80 x 0.002	160 x 0.005	160 x 0.002	400 x 0.02	800 x 0.02	1600 x 0.05	1600 x 0.02	3200 x 0.2	3.75

Table 2-1. Unit Capacities

2.2 Changing Units of Measure

After the balance has been powered up (see Section 1.7 on page 5), all display segments momentarily illuminate, followed by two flashes of all displays. The device then displays default weighing mode. If the balance does not show a *0.00* value after the normal start sequence, press and release the T key. The balance returns to a *0.00* value. The default unit of measure from the factory is *g* (grams). If the balance has already been used, a different unit of measure may already be activated. To change the active unit of measure, use the following steps:

1. Ensure that there is nothing on the platform and that the weight reading is *0.00*.
2. Press and hold the F key until the word *Func* is displayed.
3. Release the F key. The display changes to show either *1.SET.1* or *1.SET.2*.
4. Repeatedly press and release the F key to change the display, until it reads *7.un.1* (if the active unit of measure is currently *g*). If the active unit of measure is another value, *7.un.* is displayed, followed by any one of the following values: *2, 3, 4, 5, 6, 7, 8, 9, A, b,* or *C*.
5. Refer to Table 2-1 above and Table 4-1 on page 15 to determine the setting required for the desired unit of measure.
6. Repeatedly press and release the T key until the appropriate value is displayed.
7. Press and release the P key to confirm the setting.

8. The display returns to a *0.00* value for the appropriate unit of measure.

To change to a different unit of measure, repeat steps 1 – 9 above.

2.3 General Weighing

The following section provides a step-by-step procedure on general weighing using the QB Series balance.

1. Power up the balance (see Section 1.7 on page 5).
2. All display segments momentarily illuminate, followed by two flashes of all displays. The device then displays default weighing mode. To change the default unit of measure, please refer to Section 2.2 on page 6. If the balance does not show a *0.00* value after the normal start sequence, press and release the T key. The device returns to a *0.00* value.
3. Gently place the item to be weighed on the platform. The unit of measure indicator begins to flash indicating the balance is registering the weight of the commodity. The value display begins to update. When the unit of measure indicator ceases flashing, the device is stable and you can read the weight value.

2.4 Weighing with a Tare

The following section provides a step-by-step procedure on weighing with a tare using the QB Series balance.

NOTE: Whenever the tare function is activated, the effective weighing range of the device is reduced by the value of the tare. For example, on a QB-600 with a total capacity of 600g, if a tare of 100g is entered into the balance, the total effective NET weighing range of the device is only 500g (total rated capacity [600g] - tare value [100g] = 500g. Any attempt to weigh over the effective weighing range results in a "o-Err" error message.

1. Power up the balance (see Section 1.7 on page 5).
2. The balance displays default weighing mode. If the balance does not show a *0.0* value after the normal start sequence, press and release the T key.
3. The default unit of measure is displayed. To change the unit of measure, see Section 2.2.
4. Gently place the empty container on the platform. The unit of measure indicator begins to flash, indicating that the balance is registering the weight of the commodity. The value display begins to update. When the unit of measure indicator ceases flashing, the balance is stable and you can read the weight value.
5. Press the T key. The zero display (*0.00*) appears.

   NOTE: The value of the original tare must be ≥ +/- 4 displayed divisions from zero. If the original tare value is ≤ +/- 3 divisions from zero, the device automatically re-establishes a new zero setting before the T button can be activated. The tare function is not available. To disable this "auto-zero" feature, please refer to Section 4.0 on page 15.

6. Gently place the product to be weighed in the previously tared container. The unit of measure indicator begins to flash indicating that the balance is registering the weight of the commodity. The displayed value begins to update. Continue adding commodity until the display indicates the desired weight value. When the unit of measure indicator ceases flashing, the device is stable and you can read the weight value.

   NOTE: To view the gross weight of the commodity and the tare, remove the container with its contents from the weighing platform. The total weight is displayed as a negative number. To return to normal weighing, replace the container with its contents on the platform.

7. To weigh another commodity and tare or to re-use the current tare and weigh additional samples, remove the commodity and container from the platform and press the T key to have the display return to a *0.00* reading, then repeat steps 1– 6.

2.5 Batching

The following section provides a step-by-step procedure on using the batching feature of the QB Series balance.

NOTE: Whenever the tare function is activated on a QB balance, the effective weighing range of the device is reduced by the value of the tare. For example, on a QB-600 with a total capacity of 600g, if a tare of 100g is entered into the balance, the total effective NET weighing range of the balance is only 500g (total rated capacity [600g] - tare value [100g] = 500g). Any attempt to weigh over the effective weighing range results in a "o-Err" error message.

1. Power up the balance (see Section 1.7 on page 5).

2. The balance displays default weighing mode. If the balance does not show a *0.0* value after the normal start sequence, press and release the T key.
3. The default unit of measure is displayed. To change the unit of measure, see Section 2.2.
4. Gently place the empty container on the platform. The unit of measure indicator begins to flash indicating the device is registering the weight of the commodity. The value display begins to update. When the unit of measure indicator ceases flashing, the balance is stable and you can read the weight value.
5. Press the T key. The zero display (*0.00*) appears.

   NOTE: The tare value must be ≥ ± 4 display divisions from zero. If the tare value is ≤ ± 3 divisions from zero, the device automatically re-establishes a new zero setting before the T button can be activated. The tare function is not available. To disable this auto-zero feature, please refer to Section 4.0 on page 15.
6. Gently place the commodity to be weighed in the previously tared container.
7. The unit of measure indicator begins to flash indicating the device is registering the weight of the commodity.
8. The value display begins to update.
9. Continue adding commodity until the display indicates the desired weight value.
10. When the unit of measure indicator ceases flashing, the device is stable and you can read the weight value.
11. Without removing the product, press the T key.
12. Gently add the next product quantity. Only the net weight of the new commodity is displayed.
13. Repeat steps 11 and 12 as necessary.

    NOTE: To view the gross weight of the commodity and the tare, remove the container with its contents from the weighing platform. The total weight is displayed as a negative number. To return to normal weighing, replace the container with its contents on the platform.

2.6 Removing the Tare

Use the following steps to remove a tare value from the QB balance:

1. Remove the container (empty or full) from the weighing platform.
2. The display shows the weight of the container and the commodity, if any, as a negative value.
3. Press and release the T key.
4. The display returns to a *0.0* value.

2.7 Weighing with the Comparator Function

The QB Series balance is equipped with an onboard comparator function that determines how the weight of a commodity relates to a pre-determined over/under zone. This feature can help alleviate weighing errors and speed up the judgement-making process. Rather than reading a weight value and making a mental calculation as to whether or not the value is acceptable, the operator can simply concentrate on the *OVER*, *UNDER* and *ACCEPT* indicators to determine whether a weight value is acceptable or not. The comparator function is not available in the counting mode.

NOTE: When the counting mode is activated, the comparator function is automatically deactivated. Should you desire to return to the comparator function, all of the most recently entered parameters are automatically recalled when the counting function is deactivated (see Section 2.9 on page 12).

2.7.1 Comparator Function Activation

Prior to using the comparator function, the parameters for the operation must be programmed into the device. Use the following steps to program the parameters for the comparator function.

1. Power up the balance (see Section 1.7 on page 5).
2. The balance displays default weighing mode. If the balance does not show a *0.0* value after the normal start sequence, press and release the T key.
3. The default unit of measure is displayed. To change the unit of measure, see Section 2.2.
4. Press and hold the F key until the word *Func* is displayed.

5. Release the F key. The display changes to show either *1.SET.1* or *1.SET.2*. If the display shows *1.SET.1*, continue with step 6 below. If the display shows *1.SET.2*, press and release the T key once to change the value to *1.SET.1*, then continue with step 6 below.
6. Press and release the F key once. The display changes to read *2.SEL.1*. This indicates that the comparator function is currently inactive.
7. Press and release the T key once. The display changes to read *2.SEL.2*. This indicates that the comparator function is active.
8. Press and release the F key once. The display changes to read *21.Co.X*, where "X" is a value of either 1 or 2. Continue with Section 2.7.2 to establish the basic parameter configuration of the comparator function.

2.7.2 Basic Over/Under Parameter Selection

1. With the display reading *21.Co.X*, where "X" is a value of either *1* or *2*, (see step 8, Section 2.7.1 above), determine if you wish to have the comparator function with only a stable weight reading *(recommended)* or for all weight readings. If you wish to have a comparison done for only stable weight readings press and release the T key until the display reads *21.Co.2*. If you wish to have a comparison done for all weight readings, press and release the T key until the display reads *21.Co.1*.
2. Press and release the F key once. The display changes to read *22.Li.X* where "X" is a value of either *0* or *1*.
3. Determine if you wish to have a comparison performed for the entire weighing range of the balance, or if you wish to exclude comparisons for values close to zero and for negative values *(recommended)*. If you wish to have comparisons performed for the entire weighing range of the balance, press and release the T key until the display reads *22.Li.1*. If you wish to have comparisons excluded for values close to zero and for negative weight values (*recommended*), press and release the T key until the display reads *22.Li.0*.
4. Press and release the F key once. The display changes to read *23.bu.X*, where "X" is a value of either *0*, *1*, *2*, *3*, *4*, *5*, or *6*.
5. Determine which of the following visual indications you would prefer for the various over/under/accept conditions.

Parameter Value	Indication
23.bu.0	Solid arrow next to appropriate display legend
23.bu.1	Flashing arrow next to UNDER display legend. Solid arrow next to ACCEPT and OVER display legends
23.bu.2	Flashing arrow next to ACCEPT display legend. Solid arrow next to UNDER and OVER display legends
23.bu.3	Flashing arrow next to OVER display legend. Solid arrow next to UNDER and ACCEPT display legends
23.bu.4	Flashing arrow next to UNDER and ACCEPT display legends. Solid arrow next to OVER display legend
23.bu.5	Flashing arrow next to ACCEPT and OVER display legends. Solid arrow next to UNDER display legend
23.bu.6	Flashing arrow next to ACCEPT, UNDER, and OVER display legends

Table 2-2. Over/Under Parameter Values

6. Press and release the T key repeatedly until the appropriate parameter value from Table 2-2 is selected.
7. Press and release the P key once. The display returns to a *0.00* reading and the arrows next to the display legends *OVER*, *UNDER*, and *ACCEPT* flash continuously indicating that upper and lower limits need to be established. Continue with Section 2.8.3 on page 11.

   NOTE: If the OVER, UNDER and ACCEPT arrows are not flashing, one of two conditions exist. Either the comparator function has not been turned on correctly, or there are UPPER and LOWER comparison limits already programmed into the unit. Verify that the comparator function is properly activated (see Section 2.7.1 on page 8), then continue with Section 2.8 below.

2.8 Setting the Upper and Lower Comparison Limits

There are two methods for establishing the upper and lower comparison limits – the reference sample method and the digital reference method. Section 2.8.2 on page 10 discusses the reference sample method where samples of commodity that exactly represent the upper and lower limits are weighed and memorized by the balance. Section 2.8.2 on page 10 discusses the digital reference method where the upper and lower limits are known values and can therefore be digitally keyed into the balance.

2.8.1 Reference Sample Method

Use the following steps to establish upper and lower comparison limits in the QB Series balance using the reference sample method.

1. Press and hold the P key until the display reads *L Set*, then release the P key.
2. The following indicators flash simultaneously – unit of measure, *0.00* weight value or the previously entered lower limit value, under arrow, and *M*.
3. Place a commodity on the weighing platform that represents the minimum acceptable weight value.
4. Press and release the F key once.
5. The display continues to flash showing the unit of measure, minimum acceptable weight value, under arrow, and *M* (see Figure 1-7 on page 5). Write down these values for future reference.
6. Press and release the P key once.
7. The display momentarily indicates *H Set*.
8. The following indicators then flash simultaneously: unit of measure, *0.00* weight value, over arrow (◂) and *M* (see Figure 1-7 on page 5).
9. Place a commodity on the weighing platform that represents the maximum acceptable weight value.
10. Press and release the F key once.
11. The display momentarily blanks, followed by a flashing display showing the unit of measure, maximum acceptable weight value, over arrow and *M* (see Figure 1-7 on page 5). Write down this value for future reference.
12. Press and release the P key once. The *OVER* indicator flashes and the weight display shows the value used in step 9.
13. Remove the sample from the weighing platform. The display returns to a *0.00* value and the over arrow (◂) disappears.

2.8.2 Digital Reference Method

Use the following steps to establish upper and lower comparison limits in the QB Series balance using the digital reference method.

1. Ensure that you have followed the instructions in Sections 2.7.1 and 2.7.2 on page 9, then continue below.
2. Determine and write down the values you need to use as the lower limit and upper limit values.
3. The display shows a *0.00* reading and the arrows next to the display legends OVER, UNDER, and ACCEPT flash continuously indicating that over and under limits need to be established. Continue with Section 2.8.3 on page 11.

   NOTE: If the OVER, UNDER, and ACCEPT arrows are not flashing one of two conditions exists. Either the comparator function has not been turned on correctly (see Section 2.7.1 on page 8), or there are OVER and UNDER comparison limits already programmed into the unit. Verify that the comparator function is properly activated (see Section 2.7.1 on page 8). Continue with Section 2.8.4 on page 11.
4. Press and hold the P key until the display reads *L Set*, then release the P key.
5. The following indicators flash simultaneously: unit of measure, *0.00* weight value or the previously entered lower limit value, under arrow, and *M* (see Figure 1-7 on page 5).
6. Press and release the T key once. With the exception of the least significant digit, the display stops flashing, and indicates all zeros, or the last lower limit value entered.
7. Press and release the T key once. The flashing digit changes by a value of one.
8. Continue to press and release the T key until the flashing digit reads the value you desire.
9. Press and release the F key once. The value selected in step 8 above is set. The digit stops flashing and the next most significant digit begins to flash.
10. Repeat steps 7 – 9 as necessary until the display reads the value you desire as the lower limit value.
11. If you need to change a digit once it has been set, repeatedly press and release the F key until the value you want to change is flashing. Then return to steps 7 – 9.
12. Once the balance reads the correct lower limit value, press and release the P key once. The entire display flashes showing the value you have selected as the lower limit value.
13. Press and release the P key again. The display momentarily reads *H Set*.

14. The following indicators flash simultaneously: unit of measure, *0.00* weight value or the previously entered upper limit value, over arrow (◂), and *M* (see Figure 1-7 on page 5).
15. Press and release the T key once. With the exception of the least significant digit, the display stops flashing, and indicates all zeros, or the last upper limit value entered.
16. Press and release the T key once. The flashing display changes by a value of one.
17. Continue to press and release the T key until the flashing display reads the value you desire.
18. Press and release the F key once. The value selected in step 17 above is set. The display stops flashing and the next most significant digit begins to flash.
19. Repeat steps 17 and 18 as necessary until the display reads the value you desire as the upper limit value.
20. If you need to change a digit once it has been set, repeatedly press and release the F key until the value you want to change is flashing. Then return to steps 17 and 18.
21. Once the balance reads the correct upper limit value, press and release the P key once. The entire display flashes showing the value you have selected as the lower limit value.
22. Press and release the P key again. The display returns to the weighing mode showing a *0.00* value.

2.8.3 Weighing with the Comparator Function

Once the comparator function has been activated (see Section 2.7.1 on page 8) and upper and lower limit values have been set (see Section 2.8 on page 9), use with the following steps to weigh with the comparator function:

1. Place a commodity on the weighing platform that is exactly equal to the lower limit value. The *ACCEPT* indicator should illuminate confirming that any sample ≥ the lower limit value is acceptable. If not, return to Section 2.8.1 or 2.8.2 on page 10 to re-enter the lower limit value.
2. Place a commodity on the weighing platform that is exactly equal to the upper limit value. The *ACCEPT* indicator should illuminate confirming that any sample ≤ the upper limit value is acceptable. If not, return to Section 2.8.1 or 2.8.2 on page 10 to re-enter the upper limit value.
3. Once the lower and upper limits are functioning correctly, any sample that is ≤ the upper limit value and ≥ the lower limit value is acceptable.
4. Remove the test sample from the platform.
5. If the balance does not show a *0.00* value, press and release the T key. The balance returns to a *0.00* value.
6. If applicable, place an empty container on the platform and press the T key. The balance returns to a *0.00* reading (see Section 2.4 on page 7)
7. Gently place the item to be weighed on the platform. The unit of measure indicator begins to flash indicating the balance is registering the weight of the commodity. The displayed value begins to update. When the unit of measure indicator ceases flashing, the balance is stable and displays the weight value along with the appropriate *OVER*, *UNDER* or *ACCEPT* indicator illuminated.

2.8.4 Deactivating the Comparator Function

Use the following steps to deactivate the comparator function in the QB Series balance.

1. Press and hold the F key until the word *Func* is displayed.
2. Release the F key. The display changes to show *1.SET.1*.
3. Press and release the F key once. The display changes to read *2.SEL.2*. This indicates that the comparator function is currently active.
4. Press and release the T key once. The display changes to read *2.SEL.1*. This indicates that the comparator function is inactive. Any existing over/under parameters remain in memory, but are inactive.
5. Press and hold the F key for approximately four seconds. The display returns the conventional weighing mode and the comparator function is inoperative.

2.9 Operating the Counting Function

The QB Series balance is capable of functioning as a counting device, enabling it to determine quantity as opposed to weight. In order to perform this function, the balance must be programmed with the average piece weight of the sample being evaluated. Once programmed, the balance performs the following calculation to determine the total number of pieces to display:

Weight on platform - tare weight (if applicable) / average piece weight = displayed piece count

NOTE: When the counting mode is activated, the comparator function is automatically deactivated. Should you desire to return to the comparator function, all of the most recently entered parameters are automatically recalled when the counting function is deactivated. If you need to return to the counting mode at a later time, the last average piece weight utilized is still active.

2.9.1 Counting Function Activation

Prior to using the counting function, the parameters for the operation must be programmed into the balance.

1. Power up the balance (see Section 1.7 on page 5).
2. The balance displays the default weighing mode. If the balance does not show a *0.00* value after the normal start sequence, press and release the T key.
3. Press and hold the F key until the word *Func* is displayed.
4. Release the F key. The display changes to show either *1.SET.1* or *1.SET.2*. If the display shows *1.SET.2*, continue below with step 5. If the display shows *1.SET.1*, press the T key once to change the value to *1.SET.2* and then continue with step 5 below.
5. Press and release the P key once. The display advances to the weighing mode with a *0* value and the *P* (counting pieces) indicator illuminated.

2.9.2 Programming the Average Piece Weight

To program the average piece weight, use the steps outlined below.

NOTE: The QB series balance can determine the average piece weight by evaluating initial samples of 10, 30, 50, or 100 pieces. We strongly recommend that you always use a sample of 100 pieces to ensure the most uniform sample piece calculation resulting in the most accurate counting operation possible based on the samples provided. It is important to remember that an accurate counting function relies on a uniformity of parts being counted. If there is a large variance from piece to piece, that error is introduced into the counting function with a resultant error in the value displayed by the balance.

1. Press and release the T key once to ensure that the value on the display is *0*.
2. If you desire to use a container to hold the parts to be counted, place the empty container on the weighing platform.
3. The display may change to indicate a counting value. Press and release the T key to return the display to a *0* value.

   NOTES:

   - *The tare value must be ≥ +/- 4 display divisions from zero. If the tare value is ≤ +/- 3 divisions from zero, the balance automatically re-establishes a new zero setting before the T button can be activated. The tare function is not available. To disable this "auto-zero" feature, please refer to Section 4.0 on page 15.*
   - *Whenever the tare function is activated on a QB balance, the effective weighing range of the device is reduced by the value of the tare. For example, on a QB-600 with a total capacity of 600g, if a tare of 100g is entered into the device, the total effective NET weighing range of the balance is only 500g (total rated capacity [600g] - tare value [100g] = 500g. Any attempt to weigh over the effective weighing range results in a "o-Err" error message.*
4. Press and hold the F key until the display reads *U Set*. Then release the F key.
5. The display shows *on xxx* where "xxx" is either *10*, *30*, *50*, or *100* depending on what value was last used to determine an average piece weight.
6. Repeatedly press and release the T key until the display reads *on 100* (*recommended*) or the quantity you desire to use as a sample.
7. With the display flashing the number of pieces you have chosen to use as a sample, place those items on the weighing platform or in the empty container.
8. Press and release the F key once. The display momentarily blanks, except for the flashing *M* indicator which confirms that the balance is memorizing the average piece weight.

NOTES:

- *It is possible to use a sample that is too light for the balance to accurately calculate an average piece weight. If you notice that the display momentarily shows ADD followed by a display that includes an illuminated UNDER annunciator, you have attempted to use a sample that is too light for the device to accurately calculate an average piece weight. Continue adding additional samples and pressing the F key until the UNDER annunciator goes out or simply return to step 4 and utilize a larger sample.You can abort a sample evaluation at any time by pressing and releasing the P key once. The display momentarily displays STOP followed by a counting value display.*
- *The minimum average piece weight must be ≥ the minimum increment (readability) of the balance being used. If you notice that the display momentarily shows L-Err, the commodity in question can not be counted with this balance.*

9. The display then resumes flashing. To begin counting based on the current average piece weight calculation, press and release the P key once. The display stops flashing and the *M* indicator disappears. The balance shows the current quantity of the commodity on the weighing platform. Proceed to Section 2.9.4 on page 13.
10. To utilize the QB's exclusive APWR (Automatic Piece Weight Refinement) program, continue with Section 2.9.3 on page 13 (*recommended*).

2.9.3 Using the APWR (Automatic Piece Weight Refinement) Program

The APWR program is an exclusive feature of the QB Series. When utilized, its unique capabilities refine the average piece weight as often as desired to take into consideration the largest sample possible. As the average piece weight of a commodity is refined, the overall counting results are dramatically improved. Within the net weighing range of the balance, there is no limit as to how many samples are used.

1. Complete steps 1 – 8 in Section 2.9.2 on page 12.
2. With the display flashing the sample count, *M* indicator and *P* indicator, add any number of additional samples to those already being weighed.
3. Press and release the F key once. The display momentarily blanks, except for the flashing *M* indicator which confirms that the balance is calculating and updating the previously memorized average piece weight. Repeat steps 2 and 3 as many times as desired.
4. When you are ready to exit the APWR, press and release the P key once. The display stops flashing the the *M* indicator disappears.

2.9.4 Using the Counting Mode

Use the following steps to perform piece count operations on the QB Series balance.

1. Complete the steps in Section 2.9.1 – 2.9.3 as appropriate.
2. Remove the test sample from the platform.
3. If the balance does not show a *0* value, press and release the T key. The balance returns to a *0* value.
4. If applicable, place an empty container on the platform and press the T key. The balance returns to a *0* reading (see Section 2.4 on page 7).
5. Gently place the items to be counted on the weighing platform or in the empty container as appropriate.
6. The *P* annunciator begins to flash as the display updates. When the *P* annunciator stops flashing, you can read the quantity of commodity being evaluated.

2.9.5 Deactivating the Counting Mode

Use the following steps to deactivate the count mode of the QB Series balance.

1. Press and hold the F key until the word *Func* is displayed (*U SET* appears first, followed by *Func*).
2. Release the F key. The display changes to show *1.SET.2*.
3. Press and release the T key once to change the value to *1.SET.1*. This deactivates the counting mode.
4. Press and release the P key once. The display advances to the weighing mode with a *0.00* value.
5. Even though the counting mode has been deactivated, the most recently used average piece weight remains in memory and is recalled when the counting mode is reactivated.

3.0 Span Calibration

To achieve optimum accuracy from your QB Series balance, it should be calibrated on a regular basis in the environment in which it is normally used. If the device is moved to another physical environment, recalibrate the device before using it. A few extra moments invested with this section will ensure virtually error-free performance of the device.

After properly performing the installation guidelines (see Section 1.3 on page 2 and Section 1.4 on page 3), follow these calibration steps.

1. Power up the balance (Section 1.7 on page 5).
2. Have ASTM Class 4 test weights available equal to 100% of the nominal capacity (in grams) of the device. (Weights and weight sets are available from Rice Lake Weighing Systems.)
3. Ensure that there is no load on the platform.
4. Ensure that the device is level and on a stable surface, free from environmental changes. Pay special attention to possible and sudden changes in humidity, temperature and moving air.
5. Ensure that the balance displays a *0* or *0.00* value. If not, press and release the T key once.
6. If the device is currently using any unit of measure other than grams, activate the grams unit of measure (Section 2.2 on page 6).
7. If the device is currently in the counting mode, reactivate the conventional weighing mode (see Section 2.9.5 on page 13).
8. Press and hold the F key until the word *CAL* appears. As you press and hold the F key for approximately two seconds, the word *FUNC* appears. The word *CAL* appears after two additional seconds.
9. When the word *CAL* appears, release the F key. If you hold the F key down too long, the unit returns to the default weighing mode. If this occurs, start over at step 8.
10. While pressing and holding the T key, press and hold the F key. Release both keys at the same time. The display shows *unit 1* where *1* represents the function code for the grams unit of measure as active.
11. Press and release the F key.
12. The device momentarily displays a flashing *on 0*, indicating an automatic calibration of true mechanical zero.
13. After zero calibration, the device automatically advances to read *on F.S*.
14. Place a load equal to the nominal capacity of the device on the center of the platform.
15. The *on FS* display flashes, indicating that the device is electronically calibrating a full scale load equivalent to the nominal capacity of the device.
16. When calibration is complete, the device automatically displays the calibrated nominal capacity of the balance.
17. Remove the test load from the balance.
18. The device automatically returns to a *0.0* value and the default weighing mode.

In some rare cases, automatic calibration may not be possible. In the event of an error message during calibration, please refer to the table below for the appropriate corrective action.

Error Message	Problem	Solution
O-ERR	• Calibration load is in excess of the nominal capacity of the device. The device is out of calibration and is sensing a 100% load being greater than the nominal capacity of the device. • The calibration test load is > 100% of the nominal capacity.	• Change the test load so that it is equal to 1/2 or 3/4 the nominal capacity of the device. Then run a second calibration at 100% nominal capacity. • Reduce the test load so that it is equal to 100% of the nominal capacity of the device.
1-ERR	Calibration load is less than 1/2 of the nominal capacity of the device.	Increase the test load so that it is equal to the nominal capacity of the device.
2-ERR	Data error is in excess of 1% of the rated capacity.	Contact your RLWS dealer.

Table 3-1. Possible Calibration Process Error Messages

4.0 Function Parameters

The parameter menu allows you to activate or deactivate certain features and functions of the QB Series balance. The following section provides information on the functions of the QB and how to view and change those functions. Table 4-1 below describes the various functions of the QB.

NOTE: Bold type indicates factory setting.

Display	Setting	Function	Description
1.SET	1	Mode Selection	**Weighing mode only**
	2		Counting mode only
2.SEL	1	Comparator Function	**Comparator OFF**
	2		Comparator ON
21.CO	1	Conditional Response Parameter (available only when comparator is set to ON)	**Active when balance is stable and in motion**
	2		Active when balance is stable ONLY (*recommended*)
22.LI	0	Range Response Parameter (available only when comparator is set to ON)	**Inactive for data near zero and for negative data (*recommended*)**
	1		Active for the entire weighing range (all data)
23BU	0	Response Condition (available only when the comparator is set to ON)	**Solid arrow next to appropriate display legend**
	1		Flashing arrow next to UNDER display legend. Solid arrow next to ACCEPT and OVER display legends.
	2		Flashing arrow next to ACCEPT display legend. Solid arrow next to UNDER and OVER display legends.
	3		Flashing arrow next to OVER display legend. Solid arrow next to UNDER and ACCEPT display legends
	4		Flashing arrow next to UNDER and ACCEPT display legends. Solid arrow next to OVER display legend.
	5		Flashing arrow next to ACCEPT and OVER display legends. Solid arrow next to UNDER display legend.
	6		Flashing arrow next to ACCEPT, UNDER, and OVER display legends.
3.AO	0	Auto Zero	Auto zero function off
	1		**Auto zero function on (± 3d)**
4.AP	0	Sleep Mode	Sleep mode ON (available only when internal rechargeable battery installed). Turns device off after three minutes of inactivity when running off of battery power.
	1		**Sleep mode OFF**
5.rE	1	Response Speed	Very fast (extremely stable environment)
	2		Fast (stable environment)
	3		**Average (typical environment)**
	4		Slow (difficult environment)
	5		Very slow (unstable working environment)
6.IF	0	Baud rate (available only when optional RS-232 is installed).	**Interface off or not installed**
	1		Continuous serial output (6-digit)
	2		Continuous serial output (7-digit)

Table 4-1. Function List

Display	Setting	Function	Description	
61.0.C	0	Output control (available only when interface option is set to ON)	Output prohibited (stop)	
	1		Continuous output NOTE: When the RS-232C interface is installed, output interval of data in constant transmission is 0.1 – 1 second, depending on the weighing condition and response parameters of 5.rE.X above.	
	2		Continuous output when data is stable. No output when data is unstable. NOTE: When RS-232C interface installed, output interval of data in constant transmission is 0.1 – 1 second, depending on the weighing condition and response parameters of 5.rE.X above.	
	3		Data output x 1 each time P key is pressed and released in weighing mode	
	4		Automatic output x 1 after data stablized NOTE: Only one transmission is sent after a stabilization from an increasing load. No additional output will be generated until the device returns to a 0.00 value and resets for the next load.	
	5		Automatic output x 1 of stable data; output prohibited if data unstable	
	6		Automatic output x 1 of stable data; continuous output of unstable data	
	7		Data output x 1 each time P key is pressed and released with data stablized	
62.6L	1	Baud rate (available only when interface option is set to ON)	1200 bps	
	2		2400 bps	
	3		4800 bps	
63.PA	0	Parity bit selection (avalable only when interface option is set to ON)	None	Available only when option 6.IF.2 is selected (parity bit available only in 7-digit format)
	1		Odd	
	2		Even	
7.UN	1	Unit of measure	gram	
	2		kilogram	
	3		carat	
	4		decimal ounce	
	5		pound	
	6		troy ounce	
	7		pennyweight	
	8		grain	
	9		Hong Kong tael	
	A		Singapore tael	
	b		Taiwanese tael	
	C		momme	

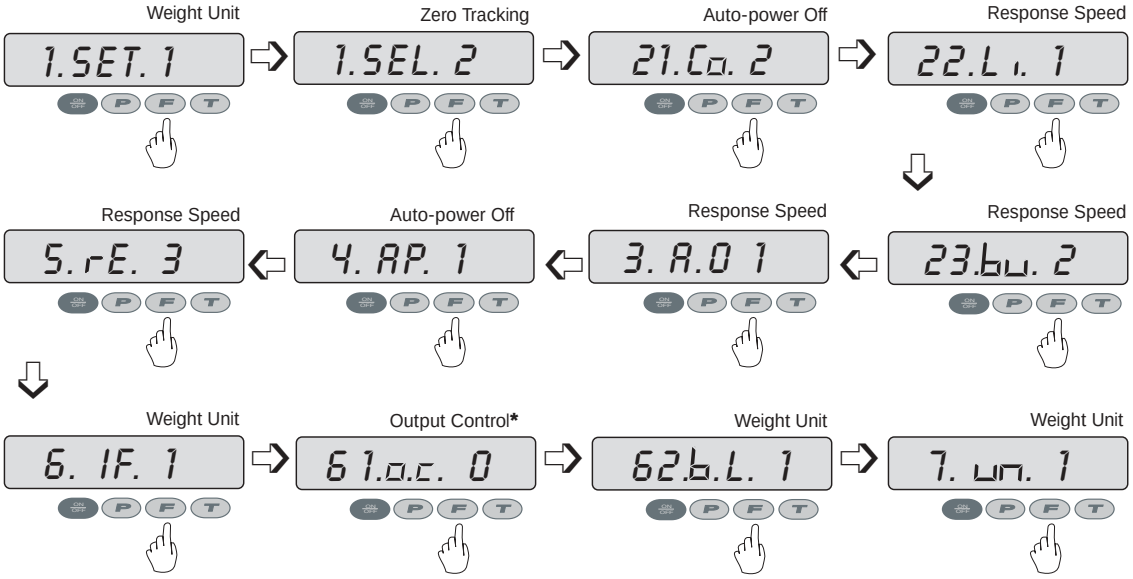
Table 4-1. Function List (Continued)

4.1 Viewing Parameters

The following information provides a step-by-step procedure to view the parameters of the QB Series balance.

1. Turn the balance on (see Section 1.7 on page 5).
2. If the device does not show a *0.0* value after the normal start sequence, press and release the P key.
3. Turn the counting function off (see Section 2.9.5 on page 13).
4. Press and hold the F key until the display reads *FUNC*.
5. Immediately release the F key.

   NOTE: If you hold the F key down too long, the display changes from FUNC to CAL. Simply press and release the P key to return to the default weighing mode and return to step 4.
6. When you release the F key, the display reads *1.SEt.X* where "X" is a value of either *1* or *2*. (see Table 4-1 on page 15 for a definition of these parameters).
7. Press and release the F key again to advance to the next parameter display. Compare the information in the display to the information in Table 4-1 on page 15.
8. Continue to press and release the F key to scroll through each of the parameter function displays.



**Only applies when device is RS-232 equipped.*

Figure 4-1. Function Parameters

9. When you press and release the F key after the last parameter, the device returns to the default weighing mode.

4.2 Changing Parameters

The following information provides a step-by-step procedure for changing the parameters of the QB Series balance.

1. Turn the balance on (see Section 1.7 on page 5).
2. Ensure there is no load on the platform.
3. Ensure that the device is in the normal weighing mode, not the counting mode. To turn off the counting mode and return to the normal weighing mode, see Section 2.9.5 on page 13.
4. If the device does not show a *0.0* value after the normal start sequence, press and release the T key.
5. Press and hold the F key until the display reads *FUNC*.
6. Immediately release the F key.
7. If you hold the F key down too long, the display changes from *FUNC* to *CAL*. Press and release the P key to return to the default weighing mode and return to step 4.
8. When you release the F key, the display reads *1.SEt. 1.*

9. Using Table 4-1 on page 15 as a guide, scroll to the function you wish to change by repeatedly pressing the F key. If you scroll through all of the functions, the device automatically returns to the conventional weighing mode. To return to the function mode, return to step 5.
10. Once the function you wish to change is displayed, repeatedly press the T key until the parameter you want to use is displayed.
11. To continue on to another function, return to step 9.
12. If you do not need to change another function, press the P key to confirm your settings and return to the conventional weighing mode.

5.0 Specifications

This section contains tables listing common specifications and model specific data for the QB Series balance. Table 5-1 below provides specifications of each of the models in the QB Series of balances.

Unit of Measure (Display Symbol)	QB-150E	QB-300E	QB-600E	QB-620E	QB-1500E	QB-3000E	QB-6000E	QB-6200E	QB-12KE
gram (g)	150 x 0.01	300 x 0.01	600 x 0.02	620 x 0.01	1500 x 0.1	3000 x 0.1	6000 x 0.2	6200 x 0.1	12000 x 1
kilogram (kg)	0.15 x 0.00001	0.3 x 0.00001	0.6 x 0.00002	0.62 x 0.0001	1.500 x 0.0001	3 x 0.0001	6 x 0.0002	6.2 x 0.0001	12 x 0.001
carat (▸)	750 x 0.05	1500 x 0.05	3000 x 0.1	3100 x 0.05	7500 x 0.5	15000 x 0.5	30000 x 1	31000 x 0.5	60000 x 5
ounce (▸)	5.2 x 0.0005	10 x 0.0005	21 x 0.0005	21 x 0.0005	52 x 0.005	100 x 0.005	210 x 0.005	210 x 0.005	420 x 0.05
pound (▸)	0.33 x 0.00002	0.66 x 0.00002	1.3 x 0.00005	1.3 x 0.00002	3.3 x 0.0002	6.6 x 0.0002	13 x 0.0005	13 x 0.0002	26 x 0.002
troy ounce (▸)	4.8 x 0.0005	9.6 x 0.0005	19 x 0.0005	19 x 0.0005	48 x 0.005	96 x 0.005	190 x 0.005	190 x 0.005	380 x 0.05
pennyweight (▸)	96 x 0.005	190 x 0.005	380 x 0.01	390 x 0.005	960 x 0.05	1900 x 0.05	3800 x 0.1	3900 x 0.05	7700 x 0.5
grain (▸)	2300 x 0.2	4600 x 0.2	9200 x 0.5	9500 x 0.2	2300 x 2	46000 x 2	92000 x 5	95000 x 2	18000 x 20
HK tael (▸)	4 x 0.002	8 x 0.0002	16 x 0.0005	16 x 0.0002	40 x 0.002	80 x 0.002	160 x 0.005	160 x 0.002	320 x 0.02
Sing tael (▸)	3.9 x 0.0002	7.9 x 0.0002	15 x 0.0005	16 x 0.0002	39 x 0.002	79 x 0.002	150 x 0.005	160 x 0.002	310 x 0.02
Taiwanese tael (▸)	4 x 0.0002	8 x 0.0002	16 x 0.0005	16 x 0.0002	40 x 0.002	80 x 0.002	160 x 0.005	160 x 0.002	320 x 0.02
momme (▸)	40 x 0.002	80 x 0.002	160 x 0.005	160 x 0.002	400 x 0.02	800 x 0.02	1600 x 0.05	1600 x 0.02	3200 x 0.2
Tare range	100%, push-button								
Percentage of minimum division	0.025	0.05	0.05	0.1	0.025	0.05	0.25	0.1	0.1
Linearity (g)	±0.01	±0.01	±0.02	±0.01	±0.1	±0.1	±0.2	±0.1	±1
Repeatibility/ Standard Dev. (g)	±0.01	±0.01	±0.02	±0.01	±0.1	±0.1	±0.2	±0.1	±1
Sensitivity drift (ppm/degree C/ span)	±10								
Pan size (mm)	140∅				190 x 190				
Pan size (in)	5.512∅				7.48 x 7.48				
Physical dimensions (mm)	See Figure 7-1 on page 27								
Physical dimensions (in)	See Figure 7-1 on page 27								
Display	0.4724“ (12mm) 6-digit LCD								

Table 5-1. Model Specific Data

Unit of Measure (Display Symbol)	QB-150E	QB-300E	QB-600E	QB-620E	QB-1500E	QB-3000E	QB-6000E	QB-6200E	QB-12KE
Shipping weight (lb)	1.27				1.59				
Admissable RH%	80% RH (Non-condensing; max)								
Admissable ambient temp	0° - 40° C 32° - 104° F								
Calibration method	Semi-automatic, external calibration with reference weight								
Calibration mass (g)*	150	300	600	620	1500	3000	6000	6200	12000
Power	115/230 VAC (via AC adapter) 50/60 Hz								
Accessories included	115 VAC adapter, operating instructions, in-use cover								

Table 5-1. Model Specific Data (Continued)

** Recommended ASTM Class 4.*

5.1 RS-232C Specifications

The QB Series may be equipped with an optional RS-232C feature (PN 42174), which is compatible for communication with printers and computers. When the balance is connected directly to a printer, displayed data can be output either via the P key on the balance, or automatically when certain conditions have been met. Refer to Table 4-1 on page 15 for a list of parameters available.

NOTE: The optional battery pack (PN 42169) cannot be used simultaneously with the RS-232C option.

5.1.1 Pin Function

Pin Number	Signal	Output/Input	Function
1	Tare	Input	External tare input (1)
2	DTR	Output	High level with scale power *ON*
3	RXD	Input	Receiving data
4	TXD	Output	Transmission data
5	GND	N/A	Signal ground

Table 5-2. RS-232C Pin Function

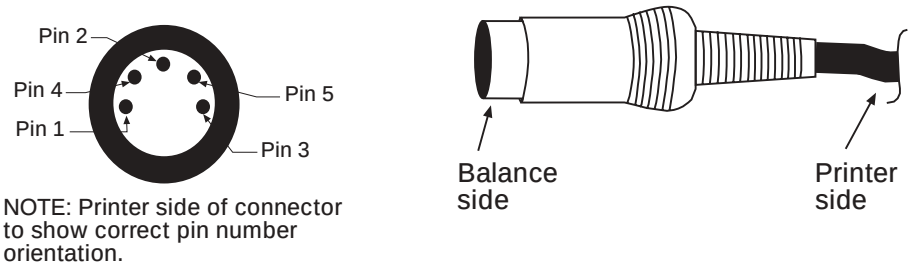


Figure 5-1. RS-232 Connector Schematic

5.1.2 RS-232C Commands

One of the following two formats is selectable in the function setting (see Section 4.0 on page 15).

6-digit data format (Content: 14 words, including terminators; CR = 0DH, LF = 0AH)													
1	2	3	4	5	6	7	8	9	10	11	12	13	14
P1	D1	D2	D3	D4	D5	D6	D7	U1	U2	S1	S2	CR	LF

Table 5-3. RS-232C 6-digit Command Format

7-digit data format*														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
P1	D1	D2	D3	D4	D5	D6	D7	D8	U1	U2	S1	S2	CR	LF
**Note inclusion of D8.*														

Table 5-4. RS-232C 7-digit Command Format

Data D1 ~ D7, 7 words with 6-digit format (see Table 5-3) D1 ~ D8, 8 words with 7-digit format (see Table 5-4)		
D	Code	Contents
0~9	30H ~ 39H	Data 0 ~ 9 (Max 6 digits with 6-digit format or max 7 digits with 7-digit format)
.	2EH	Decimal point (floating)
sp	20H	Space; leading zero suppression

Table 5-5. Data

Polarity: P1 = 1 word		
P1	Code	Contents
+	2BH	Data is 0 or positive
–	2DH	Data is negative
sp	20H	Data is 0 or positive

Table 5-6. Polarity

Units (U1, U2 = 2 words, based on ASCII codes)			
U1	U2	Contents	Symbol
k	g	kilogram	kg
p	c	quantity	(pcs)
m	o	momme	mom
l	b	pound	lb
d	w	pennyweight	dwt
t	l	tael	tl

Table 5-7. Units

Units (U1, U2 = 2 words, based on ASCII codes)			
sp	g	gram	g
c	t	carat	ct
o	z	ounce	oz
o	t	troy ounce	ozt
g	g	grain	gr

Table 5-7. Units (Continued)

Conditional Response Parameter For Comparator Function (S1 = 1 word)		
S1	Code	Contents
l	4CH	Low (under)
g	47H	Good (accept)
h	48H	High (over)

Table 5-8. Conditional Response Parameter for Comparator Function

Status of Data (S2 = 1 word)		
S2	Code	Contents
s	53H	Data stabilized
u	55H	Data unstabilized
e	45H	Erroneous data; all data unreliable except S2 (device display reads either “o-Err” or “u-Err”)

Table 5-9. Input Command, Data Reception

The balance can be controlled by transmitting commands from an external device and is independent of the timing on the device due to the full duplex nature of the interface. If the command is properly received, the balance transmits acknowledgement (ACK, code 06H). If the command is unacceptable, the balance transmits non-acceptance (NAK, code 15H).

In the conventional display weighing mode (non-counting mode), the device responds with ACK or NAK within one second of receipt of command.

When transmitting function code changes, such as unit of measure, conditional response parameter, or calibration commands, ACK or NAK are transmitted after completion of the requested command process (e.g., when the new parameter has been set and confirmed). Commands that are sent before ACK or NAK are transmitted from the device are ignored.

Input format command consists of four (4) words, including terminators (CR=0DH or LF=0AH) as follows:

1	2	3	4
C1	C2	CR	LF

External tare command is as follows:

C1	C2	CODE	Contents
T	sp	54h 20H	Tare Command

5.1.3 Output Control Settings

C1	C2	Code 1	Code 2	Contents
0	0	4FH	30H	Interface off, no printing available
0	1	4FH	31H	Automatic continuous printing of zero display, unstable and stable weighing values
0	2	4FH	32H	Automatic continuous printing of stabilized data only (for example, stable *0* value and stable weight value)
0	3	4FH	33H	Pushbutton printing from balance P key of stable *0* value and stable weight value
0	4	4FH	34H	Auto-printing of stabilized weight value only
0	5	4FH	35H	Auto-printing x 1 of stabilized zero value and stabilized weight value
0	6	4FH	36H	Auto-printing x 1 of any weight stable display value
0	7	4FH	37H	Pushbutton printing from balance P key of stable *0* value and stable weight value
0	8	4FH	38H	Automatic output x 1 of stable data; continuous output of unstable data
0	9	4FH	39H	Data output x 1 each time P key is pressed and released with data stabilized

Table 5-10. Output Control Settings

NOTES:

• The performance of the device can be controlled by output controls with commands 00-07 and by the parameter settings (see Table 4-1 on page 15). Commands 08 and 09 are limited to an input command string.

• Once any command is initiated, that status is maintained until a new command is initiated. However, once the power is turned off, the output control status returns to the setting previous to the last input command.

5.1.4 Interface Specifications

Item	Specification
Transmission method	RS-232C serial data, random access
Transmission speed	1200/2400/4800 bps; user selectable; (see Table 4-1 on page 15)
Transmission code	ASCII; 8-bit
Signal level	EIA RS-232C; High Level - Data logic “0” + 5 VDC to +15 VDC Low Level - Data logic “1” -5 VDC to -15 VDC
Contents of word	8-bit word based on ASCII standard character codes; 1 start bit; 2 stop bits; 0/1 parity bit
Parity bit	Null, even or odd parity

Table 5-11. RS-232C Interface Specifications

5.2 Connecting to a Computer

Connecting the balance to a computer enables you to operate the balance from the computer as well as receive data such as displayed weight and unit of measure. The following sections describe the hardware and output signal formats provided with the balance.

5.2.1 Hardware

A 5-pin DIN connector for interfacing to other devices (see Figure 5-2 on page 24) is located on the rear of the QB Series balances equipped with the optional RS-232C interface.

The balance does not output any data unless pin 2 is held in an ON state (+5 VDC to +15 VDC). Interfaces requiring the CTS handshake may tie pins 5, 4, and 8 on the computer side to defeat it.

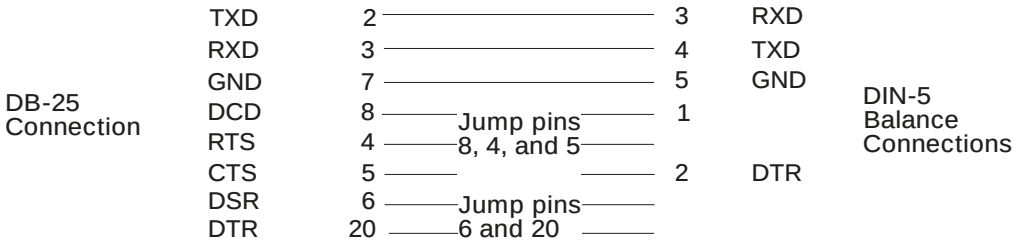


Figure 5-2. Connection to a Computer

5.3 Accessories

RLWS Part Number	Description
42566	115 VAC adapter for QB/MB Series balances
42168	230 VAC adapter for MB/QB/IB Series balances
42171	Internal rechargeable battery for QB Series (incompatible with PN 42174 below)
42174	RS-232C interface for QB Series (incompatible with PN 42171 above) includes DIN-5 pin connector (cable not included)
42177	Glass breeze break for QB Series (scales with round weighing pans only)
42181	In-use cover
41555	Limit output pack
42194	Additional operating manual

Table 5-12. MB Series Balance Accessories

6.0 Troubleshooting

The following section contains a troubleshooting chart for the QB Series scale. Refer to this chart to locate causes and corrective actions to various conditions.

Condition	Cause	Corrective Action
Display does not stabilize	• Wind or vibration is affecting scale	• Set up balance elsewhere or under a protective hood
	• Scale is set on unstable surface	• Set the scale on a firm surface that is free from vibrations
	• Span is out of calibration	• Level the scale • Perform span and zero adjustment
Displayed value is in error Weight value is drifting	• Tare value entered incorrectly	• Clear and re-enter tare value
	• Balance is not set level	• Set balance level
	• Span is out of calibration	• Perform span adjustment
	• Interference with weigh pan or pan support	• Check for foreign material under weigh pan or weigh pan support
Linearity error	• Mechanical adjustment has changed	• Consult your local Rice Lake Weighing Systems Service distributor
Display is blank	• Adapter is not connected • Battery needs recharging • Auto Power OFF is activated.	• Connect AC adapter to the scale and 120 VAC outlet • Recharge battery • Press the ON/OFF key
Comparator limits can not be established	• Device is not set to comparator mode • Reference value is greater than the nominal capacity of the device • Lower limit value is ≥ upper limit value	• Turn on comparator mode • Change reference value • Change lower limit value
Balance does not weigh to nominal capacity	• Tare + sample weight exceeds capacity • (Weight range = maximum capacity – tare weight)	• Add the individual weights of the tare and the commodity to determine if together they are more than the nominal capacity of the device
b-ERR	• Electronic malfunction due to electro-static discharge (ESD) or electro-magnetic interference (EMI)	• Consult your local Rice Lake Weighing Systems distributor
L-ERR	• In counting mode, the unit weight of the samples is less than the minimum division of the device	• This commodity can not be counted with this device
O-ERR	• Capacity is exceeded	• Use a test mass to ensure the balance can weigh to its rated capacity • Ensure that the commodity being weighed is not in excess to the nominal capacity of the balance • Consult your local Rice Lake Weighing Systems distributor
U-ERR	• Interference with the weighing pan or weighing pan support	• Remove interference

Table 6-1. Troubleshooting Chart

Condition	Cause	Corrective Action
1-ERR	• The calibration weight is less than 1/2 full capacity	• Reinitiate calibration with a test mass equal to the nominal capacity of the balance • Consult your local Rice Lake Weighing Systems distributor
2-ERR	• The data error exceeds 1% • Defective weighing mechanism	• Consult your local Rice Lake Weighing Systems distributor
3-ERR 4-ERR	• Calibration has started with a load on the platter	• Remove load and reinitiate calibration process • Consult your local Rice Lake Weighing Systems distributor
U-ERR	• Material wedged underneath the platform support plate	• Remove platform and platform support plate, then clean and reassemble

Table 6-1. Troubleshooting Chart (Continued)

7.0 Dimensions

Figure 7-1 below shows the dimensions of the QB Series balance.

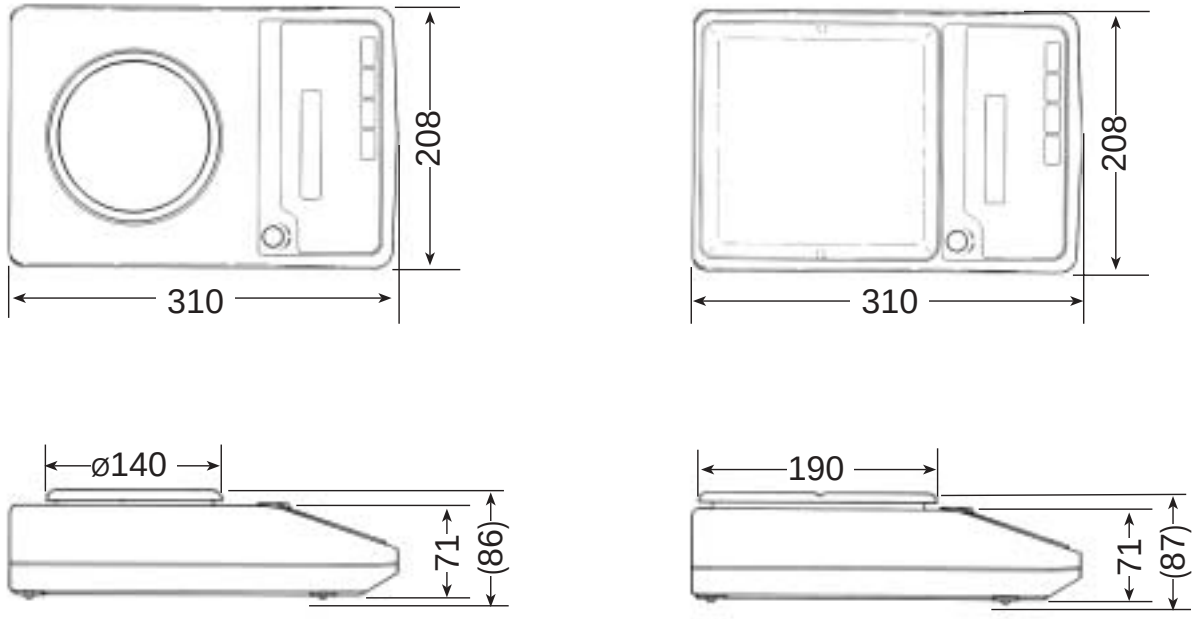


Figure 7-1. QB Series Dimensions

QB Series Limited Warranty

Rice Lake Weighing Systems (RLWS) warrants that all RLWS equipment and systems manufactured and sold by RLWS and properly installed by an authorized RLWS Distributor or Original Equipment Manufacturer (OEM) will operate per written specifications as confirmed by the Distributor/OEM and accepted by RLWS. All systems and components are warranted against defects in materials and workmanship for five years.

RLWS warrants that the equipment sold hereunder will conform to the current written specifications authorized by RLWS. RLWS warrants the equipment against faulty workmanship and defective materials. If any equipment fails to conform to these warranties, RLWS will, at its option, repair or replace such goods returned within the warranty period subject to the following conditions:

- Upon discovery by Buyer of such nonconformity, RLWS will be given prompt written notice with a detailed explanation of the alleged deficiencies.
- Individual electronic components returned to RLWS for warranty purposes must be packaged to prevent electrostatic discharge (ESD) damage in shipment. Packaging requirements are listed in a publication, *Protecting Your Components From Static Damage in Shipment*, available from RLWS Equipment Return Department.
- Examination of such equipment by RLWS confirms that the nonconformity actually exists, and was not caused by accident, misuse, neglect, alteration, improper installation, improper repair or improper testing; RLWS shall be the sole judge of all alleged non-conformities.
- Such equipment has not been modified, altered, or changed by any person other than RLWS or its duly authorized repair agents.
- RLWS will have a reasonable time to repair or replace the defective equipment. Buyer is responsible for shipping charges both ways.
- In no event will RLWS be responsible for travel time or on-location repairs, including assembly or disassembly of equipment, nor will RLWS be liable for the cost of any repairs made by others.

THESE WARRANTIES EXCLUDE ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. NEITHER RLWS NOR DISTRIBUTOR WILL, IN ANY EVENT, BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

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SHOULD THE SELLER BE OTHER THAN RLWS, THE BUYER AGREES TO LOOK ONLY TO THE SELLER FOR WARRANTY CLAIMS.

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